11.0 PLANT SYSTEMS
11.11 ENVIRONMENTAL QUALIFICATION

11.11.1 CONDUCT OF REVIEW

This chapter of the revised draft Safety Evaluation Report (DSER) contains the staff's review of environmental qualification (EQ) described by the applicant in Chapter 11 of the revised Construction Authorization Request (CAR). The objective of this review is to determine whether the EQ of electrical and mechanical equipment that are principal structures, systems, and components (PSSCs) and their EQ design bases identified by the applicant provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents. The staff evaluated the information provided by the applicant for EQ of electrical and mechanical equipment by reviewing Chapter 11 of the revised CAR, other sections of the revised CAR, supplementary information provided by the applicant, and relevant documents available at the applicant's offices but not submitted by the applicant. The review of the EQ of electrical and mechanical equipment design bases and strategies was closely coordinated with the review of the electrical, instrumentation and control, and mechanical aspects of accident sequences described in the Safety Assessment of the Design Bases (see Chapter 5 of this revised DSER), and the review of other plant systems.

The staff reviewed how the information in the revised CAR addresses the following regulations:

- Section 70.23(b) of 10 CFR states, as a prerequisite to construction approval, that the design bases of the PSSCs be found to provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents.

- Section 70.64 of 10 CFR requires that baseline design criteria (BDC) and defense-in-depth practices be incorporated into the design of new facilities. With respect to the EQ of electrical and mechanical equipment, 10 CFR 70.64(a)(4) requires that the Mixed Oxide Fuel Fabrication Facility (MFFF or the facility) design "must provide for adequate protection from environmental conditions and dynamic effects associated with normal operations, maintenance, testing, and postulated accidents that could lead to loss of safety functions."

The review for this construction approval focused on the design basis of the electrical and mechanical equipment that are PSSCs specifically related to the EQ requirement. The staff used Chapter 11 in NUREG-1718, "Standard Review Plan for the Review of an Application for a Mixed Oxide (MOX) Fuel Fabrication Facility," as guidance in performing the review.

11.11.1.2 System Description

The electrical and mechanical equipment evaluated in this section are PSSCs and are major components of systems (also PSSCs) such as the confinement systems (described in revised DSER Section 11.4), the electrical systems (described in revised DSER Section 11.5), the instrumentation and control systems (described in revised DSER Section 11.6), the material transport system (described in DSER Section 11.7), the fluid transport system (described in revised DSER Section 11.8), the fluid systems (described in revised DSER Section 11.9), and the heavy lift cranes (described in revised DSER Section 11.10).

11.11.1.3 Design Basis of the PSSCs and Applicable Baseline Design Criteria

In addition to the design basis requirements for the electrical and mechanical equipment designated as PSSCs - which encompass the PSSCs within the systems listed in revised DSER Section 11.11.2 - the electrical and mechanical equipment that are designated PSSCs should remain functional when subjected to the environmental and dynamic effects referenced in the 10 CFR 70.64(a)(4) baseline design criteria. For EQ purposes, this electrical and mechanical equipment will be designed as described in the revised CAR and the staff's memorandum dated January 31, 2003 (Reference 11.11.3.2) based on the following:

- Institute of Electrical and Electronics Engineers (IEEE). Std 323-1983, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations" (Reference 11.11.3.1).

DCS states that electrical and mechanical PSSCs will be qualified to anticipated environments; including qualification to environments if the event causing the harsh environment is not prevented (Reference 11.11.3.2). Pursuant to this DCS commitment, DCS will be required to demonstrate that for each piece of electrical and mechanical equipment identified as a PSSC, these PSSCs will perform their safety functions under environmental and dynamic service conditions in which they will be required to function and for the length of time their function is required. Also, non-PSSCs will be able to withstand environmental stresses caused by environmental and dynamic service conditions under which their failure could prevent satisfactory accomplishment of safety functions by PSSCs. The staff finds that these commitments satisfy the requirements of 10 CFR 70.64 (a)(4), and notes that this approach is consistent with how EQ requirements are applied at nuclear power plants (Reference 11.11.3.3).

11.11.2 EVALUATION FINDINGS

Based on the staff's review of the revised CAR, the supporting information provided by the applicant, and the applicant's commitments to the industry guidance referenced above, the staff finds, pursuant to 10 CFR 70.64(a)(2), that for environmental qualification, the design basis of the proposed facility provides for adequate protection against environmental condition hazards. The staff concludes, pursuant to 10 CFR 70.23(b), that the design basis of the PSSCs relevant to environmental qualification of electrical and mechanical equipment will provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents.

11.11.3 REFERENCES

11.11.3.1 Institute of Electrical and Electronics Engineers (IEEE). Std 323-1983, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations." IEEE: New York, New York, September 30, 1983.

11.11.3.2 Persinko, Andrew, U.S. Nuclear Regulatory Commission (NRC), memorandum to Melvyn N. Leach, NRC, RE December 10-12, 2002, Meeting Summary: Meeting with Duke Cogema Stone & Webster to Discuss Mixed Oxide Fuel Fabrication Facility Revised Construction Authorization Request, January 31, 2003.

11.11.3.3 Nuclear Regulatory Commission (U.S.)(NRC). Regulatory Guide 1.89, Revision 1, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear power Plants." NRC: Washington, D.C. June 1984.

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